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What is claimed:

- 1. An isolated avian gonadal cell comprising a heterologous nucleic acid.
- 2. The gonadal cell of claim 1, wherein said cell is an embryonic cell.
- 3. The gonadal cell of claim 1, wherein said cell is a gonadal primordial germ cell.
 - 4. The gonadal cell of claim 1, wherein said cell is an ovarian cell.
 - 5. The gonadal cell of claim 1, wherein said cell is a testes cell.
 - 6. A method of introducing a nucleic acid molecule into the genome of an avian species, comprising contacting a population of isolated gonadal cells obtained from a chick embryo with said nucleic acid molecule to yield transfected gonadal cells, and transferring said transfected gonadal cells to a fertilized recipient avian egg.
 - 7. The method of claim 6, wherein said population comprises at least 0.5% primordial germ cells.
 - 8. The method of claim 6, wherein said population comprises at least 1% primordial germ cells.
 - 9. The method of claim 6, wherein said population comprises at least 50% primordial germ cells.

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- 10. The method of claim 6, wherein said population comprises at least 90% primordial germ cells.
- 11. The method of claim 6, wherein said chick embryo is at an embryonic stage of greater than 27.
- 12. The method of claim 6, wherein said chick embryo is at an embryonic stage of 29-36 of gestation.
- 13. The method of claim 6, wherein said transfected gonadal cells and said fertilized avian egg are derived from the same species.
- 14. The method of claim 6, wherein said transfected gonadal cells and said fertilized avian egg are derived from different species.
 - 15. The method of claim 6, wherein said fertilized avian egg is between stage 7-8.
 - 16. The method of claim 6, wherein said fertilized avian egg is between stage 13-19.
- 17. The method of claim 6, wherein the breed of said chick embryo is White Leghorn.
- 18. The method of claim 6, wherein the breed of said chick embryo and the breed of said fertilized recipient egg are different.
- 19. The method of claim 6, wherein said fertilized avian egg is partially sterilized prior to transferring said transfected gonadal cells.

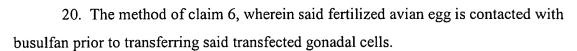
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- 21. The method of claim 6, wherein said transfected gonadal cells are transferred directly into the germinal crest of said fertilized recipient avian egg.
- 22. The method of claim 6, wherein the sex of said gonadal cells and the sex of an embryo in said fertilized recipient avian egg is the same.
- 23. An isolated avian gonadal cell, comprising a genetic disruption of an endogenous gene, wherein said disruption inhibits production of a functional gene product.
 - 24. An avian egg comprising a xenogeneic primordial germ cell.
 - 25. An avian egg comprising the cell of claim 1.